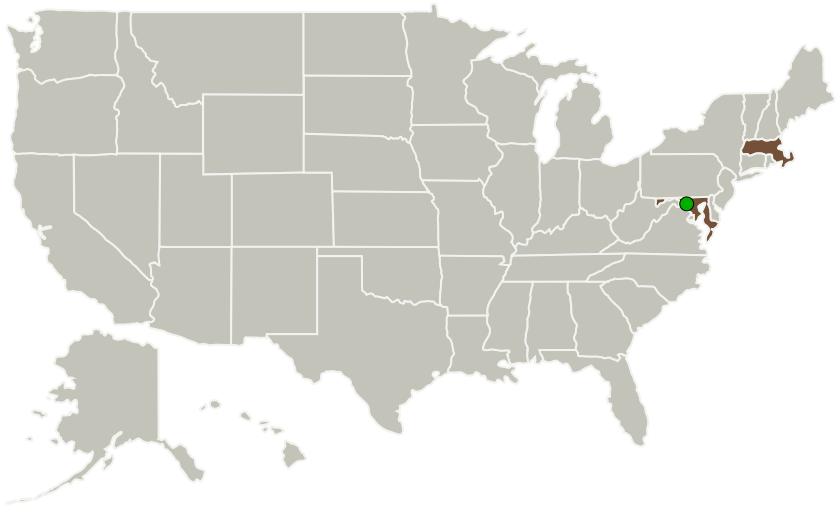
Aerogel-Based Multi-Layer Insulation with Micrometeoroid Protection, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

Cryogenic fluid management (CFM) is a critical technical area needed for successful development of Mars architectures. The biggest challenge is the storage of cryogenic propellants for long durations. These propellants have boiling points well below the environmental temperatures of earth orbit or Mars; as such, the tanks must be regularly vented to prevent over pressurization if they are not well insulated. Such venting would cause unacceptable propellant losses for the long-duration missions to Mars. Aspen Aerogels proposes to develop a multifunctional thermal insulation system that offers micrometeoroid orbital debris (MMOD) protection and inherent radiation shielding to meet NASA's CFM needs. Low density and resilient aerogel materials will be developed to provide the needed thermal and MMOD protection for space cryotank applications. The aerogels developed will have inherent radiation shielding components. Development of the proposed novel multifunctional system will provide NASA with a long-term cryogenic fluid management solution for space applications.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Aspen Aerogels, Inc.	Lead Organization	Industry	Northborough, Massachusetts
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137981)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aspen Aerogels, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

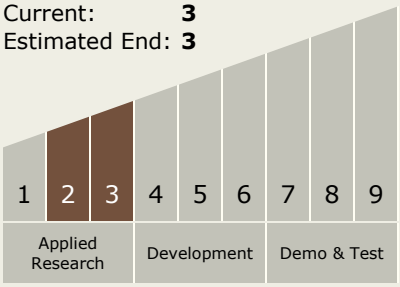
Carlos Torrez

Principal Investigator:

Redouane Begag

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.1 In-space Propellant Storage & Utilization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System